

CLAIMS:

1. A radiation source comprising an anode and a cathode that are configured and arranged to create a discharge in a substance in a discharge space between said anode and cathode and to form a plasma so as to generate electromagnetic radiation, wherein a wicking surface area of a wall defining said discharge space is configured to transport a liquid towards said discharge space from a liquid reservoir in contact with said wicking surface area.
2. A radiation source according to claim 1, wherein said wicking surface area is provided on at least one of said anode and said cathode.
3. A radiation source according to claim 1, wherein a cooling surface area of a wall defining said discharge space is provided with cooling to condense vaporized liquid from said discharge space to transfer heat from said discharge space to said cooling surface.
4. A radiation source according to claim 1, wherein a material comprised in said liquid is used in creating said plasma.
5. A radiation source according to claim 1, wherein said discharge space is provided with an elongated extension space, said cooling surface area provided on a wall of said extension space at a distance from a central region of said radiation source.
6. A radiation source according to claim 1, wherein said radiation source comprises an energetic beam to irradiate said wicking surface area proximate said discharge space.
7. A radiation source according to claim 6, wherein said energetic beam is a beam of charged particles.
8. A radiation source according to claim 6, wherein said energetic beam is a laser beam.

9. A radiation source according to claim 1, wherein said liquid comprises an element selected from the group consisting of: xenon (Xe), tin (Sn), lithium (Li), indium (In) and iridium (Ir).

10. A radiation source comprising an anode and a cathode that are configured and arranged to create a discharge in a substance in a discharge space between said anode and cathode and to form a plasma so as to generate electromagnetic radiation, wherein said discharge space is provided with an elongated extension space, a cooling surface area of a wall defining said extension space configured to be cooled to condense vaporized liquid from said discharge space and provided at a distance from a central region of said radiation source.

11. A radiation source according to claims 10, wherein said liquid comprises an element selected from the group consisting of: xenon (Xe), tin (Sn), lithium (Li), indium (In) and iridium (Ir).

12. A radiation source unit comprising:

a radiation source provided with an anode and a cathode that are configured and arranged to create a discharge in a substance in a discharge space between said anode and cathode and to form a plasma so as to generate electromagnetic radiation; and

a hollow receptacle arranged on an optical axis of said radiation source, an open end of said receptacle directed to said radiation source to capture contamination emitted from said radiation source.

13. A radiation source according to claim 12, wherein said receptacle is configured to be cooled to enhance trapping of contamination on inside walls of said receptacle.

14. A radiation source comprising an anode and a cathode that are configured and arranged to create a discharge in a substance in a discharge space between said anode and cathode and to form a plasma so as to generate electromagnetic radiation, an aperture provided in one of said anode and cathode through which said electromagnetic radiation is emitted, said

aperture comprising a plurality of electrically-conductive structures arranged so as to leave said aperture substantially open to said radiation but to substantially close said aperture electrically.

15. A radiation source according to claim 14, wherein said structures are configured to be cooled.

16. A radiation source comprising an anode and a cathode that are configured and arranged to create a discharge in a substance in a discharge space between said anode and cathode and to form a plasma so as to generate electromagnetic radiation, said radiation source comprising at least one closed heat pipe.

17. A lithographic projection apparatus comprising:
a radiation system comprising an anode and a cathode that are configured and arranged to create a discharge in a substance in a discharge space between said anode and cathode and to form a plasma so as to generate a projection beam of radiation, wherein a wicking surface area of a wall defining said discharge space is configured to transport a liquid towards said discharge space from a liquid reservoir in contact with said wicking surface area;
a support structure configured to hold a patterning device, the patterning device configured to pattern the projection beam according to a desired pattern;
a substrate table configured to hold a substrate; and
a projection system configured to project the patterned beam onto a target portion of the substrate.

18. A lithographic apparatus according to claim 17, wherein said wicking surface area is provided on at least one of said anode and said cathode.

19. A lithographic apparatus according to claim 17, wherein a cooling surface area of a wall defining said discharge space is provided with cooling to condense vaporized liquid from said discharge space to transfer heat from said discharge space to said cooling surface.

20. A lithographic projection apparatus comprising:

a radiation system comprising an anode and a cathode that are configured and arranged to create a discharge in a substance in a discharge space between said anode and cathode and to form a plasma so as to generate a projection beam of radiation, wherein said discharge space is provided with an elongated extension space, a cooling surface area of a wall defining said extension space is configured to be cooled to condense vaporized liquid from said discharge space and provided at a distance from a central region of said radiation source;

a support structure configured to hold a patterning device, the patterning device configured to pattern the projection beam according to a desired pattern;

a substrate table configured to hold a substrate; and

a projection system configured to project the patterned beam onto a target portion of the substrate.

21. A lithographic projection apparatus comprising:

a radiation system comprising:

a radiation source provided with an anode and a cathode that are configured and arranged to create a discharge in a substance in a discharge space between said anode and cathode and to form a plasma so as to generate a projection beam of radiation, and

a hollow receptacle arranged on an optical axis of said radiation source, an open end of said receptacle directed to said radiation source to capture contamination emitted from said radiation source;

a support structure configured to hold a patterning device, the patterning device configured to pattern the projection beam according to a desired pattern;

a substrate table configured to hold a substrate; and

a projection system configured to project the patterned beam onto a target portion of the substrate.

22. A lithographic apparatus according to claim 21, wherein said receptacle is configured to be cooled to enhance trapping of contamination on inside walls of said receptacle.

23. A lithographic projection apparatus comprising:

a radiation system comprising an anode and a cathode that are configured and arranged to create a discharge in a substance in a discharge space between said anode and cathode and to form a plasma so as to generate a projection beam of radiation, an aperture provided in one of said anode and cathode through which said electromagnetic radiation is emitted, said aperture comprising a plurality of electrically-conductive structures arranged so as to leave said aperture substantially open to said radiation but to substantially close said aperture electrically;

a support structure configured to hold a patterning device, the patterning device configured to pattern the projection beam according to a desired pattern;

a substrate table configured to hold a substrate; and

a projection system configured to project the patterned beam onto a target portion of the substrate.

24. A lithographic apparatus according to claim 23, wherein said structures are configured to be cooled.

25. A lithographic projection apparatus comprising:

a radiation system comprising an anode and a cathode that are configured and arranged to create a discharge in a substance in a discharge space between said anode and cathode and to form a plasma so as to generate a projection beam of radiation, said radiation source comprising at least one closed heat pipe;

a support structure configured to hold a patterning device, the patterning device configured to pattern the projection beam according to a desired pattern;

a substrate table configured to hold a substrate; and

a projection system configured to project the patterned beam onto a target portion of the substrate.